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Mutual influences of general practitioners in partnerships

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Abstract

The aim of this study was to find out whether or not general practitioners (GPs) within the same partnership show more similarities in attitudes and behaviour than GPs in different partnerships, and what the causes of these similarities might be. Knowledge of the causes of patterns of similarities within medical teams contributes to understanding medical practice variation, which is crucial in developing effective health care policies.

Data were used from the Dutch National Survey of General Practice ('87/'88), consisting of a stratified sample of 161 Dutch GPs, who served 335,000 patients in total.

To find out whether GPs in the same partnership are indeed more similar than GPs randomly chosen from different partnerships, we constructed two kinds of pairs: all possible pairs of GPs working in the same partnership (actual pairs), and randomly constructed pairs of GPs who are not working in the same partnership (random pairs). For each pair difference scores were computed for a variety of attitudes and behaviour. Difference scores for actual and random pairs were analysed using multi-level analysis.

Most differences in attitudes and behaviour were smaller for actual pairs than for random pairs. Furthermore, in the majority of the cases differences were no longer statistically significant after explanatory variables indicating selection, gradual adaptation and rapid adaptation through shared circumstances were taken into account.

It was found that Dutch GPs working in the same partnership showed more resemblance in attitudes and behaviour than GPs not working in the same partnership. Most indications point towards circumstances, and to a lesser extent towards adaptation, as an explanation of similarities within partnerships. The implication of this study is that medical practice variations are not merely individual differences in preferred practice style, but are patterned by social processes in partnerships and local circumstances.

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Keywords: Variation; General practitioner; Partnership; Practice style; The Netherlands

Introduction

Medicine, including general practice, has become teamwork. Although lagging behind countries such as the UK and Denmark, by now more than half of Dutch general practitioners (GPs) work in partnerships or groups (Boerma & Fleming, 1998). Working in partnerships or groups implies mutual dependency and influence (perhaps unintentionally and unconsciously) on treatment decisions (Groenewegen, Dixon, & Boerma,

2002). Uncertainty and differences of opinion are omnipresent and causes of variation in medical practice, albeit not the only causes. The style of practice of GPs is influenced by more than the availability of medical knowledge (Westert, 1996).

Although variation is expected and observed (Evans, 1990; Wennberg & Gittelsohn, 1982), there are also similarities in treatment patterned by the work-environment of doctors. A study on variation in length of hospital stay showed that variation within a medical team is small, compared to variation between teams (Westert, 1992). Hence, similarities are patterned by hospitals (Arndt, Bradbury, & Golec, 1995; Westert, Nieboer, & Groenewegen, 1993).

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The issue of similarities in attitudes and behaviour within partnerships is pertinent to the broader research area of medical practice variations. Understanding medical practice variation is crucial in developing effective health care policies that aim at influencing the decision-making of physicians (Stano, 1993). Physicians should use new knowledge on better treatment modalities but although best practices exist, they hardly spread. Awareness of and even a positive attitude towards a certain, better, way of practice is not enough to change behaviour (Lomas, 1989). The decision-making of physicians is influenced by more than research evidence, even if there are clear and concrete recommendations. Professional uncertainty and difference of opinion exist in medical practice and are supposed to cause variation. GPs develop mechanisms for dealing with professional uncertainty and this can cause them to be sceptical towards scientific evidence and more sensitive to peer influences (Hulscher, Wensing, Grol, van der Weijden, & van Weel, 1999; Hulscher, Wensing, van der Weijden, & Grol, 2001). Therefore, social influences are potentially important for the implementation of guidelines and for changing clinical behaviour of GPs. Social influences are sometimes used in implementation projects when networks of peers and colleagues are used. The idea is that, e.g., guidelines are more readily accepted if made and implemented by the profession (Grol, 2001). The mechanisms, however, remain unclear. A review of several implementation projects leads to the recommendation that comprehensive strategies are conditional to successful implementation (Cretin, Farley, Dolter, & Nicholas, 2001; Grimshaw et al., 2001; Grol, 2001; Gross & Pujat, 2001). Explaining medical practice variation can be useful in developing evidence-based implementation methods.

Against this background, we expect that there is substantial variation in attitudes and behaviour between GPs, but that this variation is smaller for GPs who work together in partnerships. The explanation for this phenomenon might be sought in three directions: the selection of new partners might be directed towards similarities (like seeks like), gradual adaptation to each other within a partnership might result from processes of peer approval, and, finally, the circumstances that are shared by partners might lead to similar behaviour.

A first general, descriptive question is asked:

do GPs working in partnerships show more resemblance in their attitudes and in the treatment they choose than they do to other GPs?

A second, explanatory question is:

are the observed similarities caused by selection, gradual adaptation and/or the shared circumstances GPs work under?

Background and hypotheses

Different mechanisms that might explain variation in medical practice have been described in the literature (e.g. Chassin, 1993; Wennberg, 1993; Wennberg & Gittelsohn, 1975, 1982). We search for explanations of medical practice variation in differences in characteristics of the social context. Westert (1992) introduced a model of local standards that predicts similarities among colleagues who share one work-environment. In this model, which is based on constraints instead of preferences, differences between groups of doctors are caused by inter-group differences in circumstances, such as bed supply. McClure (1982) also described effects of circumstances on the treatment doctors choose, adaptation was implicated by ideas about education and refresher courses (Chassin, 1993). Selection is found in literature on friendships (Fehr, 1996; Zeggelink, 1993), marriage (Kalmijn, 1998) and situations in which personnel is selected (e.g. Sessa & Taylor, 2000).

The processes concerning partner selection, gradual adaptation and rapid adaptation to shared circumstances are probably the same for other social situations. Probably there is resemblance in the way we select friends, find a life companion, or select personnel or a partner to work with in a partnership. Of course there are certain differences, but basic mechanisms are the same for all of these examples. One may wonder, therefore, on what basis doctors already in the partnership choose a (new) doctor to work with. This may be personal attraction, which can be compared to the way friends are chosen (Zeggelink, 1993).

For GPs careful selection might be very important in finding a new partner, because it is not so easy to get rid of a partner once s/he has entered the partnership. GPs in the Netherlands are independent professionals and mobility between partnerships is virtually absent. It is expected that GPs search for new partners among GPs they already know, or who have characteristics that can be used in the selection process as proxies for characteristics that signal trustworthy colleagues. In the process of selection implicitly or explicitly a profile will be used that a new GP has to meet. It is common that vacancies for GPs are advertised. It is, however, noteworthy that advertisements only rarely stipulate specific requirements from candidates. Similarities in attitudes and similarities in certain characteristics (university, age, etc.) would give an indication that selection processes play a role. Attitudes can come up for discussion in a job interview, while behaviour only becomes visible when people are already working together.

It is not necessarily so that selection causes similarities. A GP can be selected because of a difference with the existing partners, a reason for this can be that the partnership wants to provide for omissions in treatment

for their patients. For example, a partnership can choose a woman, to fulfil the need of patients to talk to a female doctor for instance when they have typical female problems (Van den Brink-Muinen, de Bakker, & Bensing, 1994).

Although similar people are attracted to each other (Fehr, 1996), it is also often assumed that friends influence each other and therefore become more alike (Leenders, 1995). Thus, similarities can also be caused by gradual adaptation. When a GP starts to work with other GPs in a partnership it is expected that sooner or later they will adapt to each other. Peer review is increasingly part of normal routine in medical partnerships. Doctors risk losing social approval if their medical performance is criticised by their colleagues (Westert, 1996; Westert & Groenewegen, 1999). When people evaluate their own personal skills or self-image, they rely on role equivalents (Burkhardt, 1994). Consequently, there may be pressures towards adaptation within partnerships. The process of gradual adaptation will lead to similarities in attitudes and behaviour and this will be stronger, the longer GPs work together.

Another process that can cause similarities is the adaptation to the circumstances doctors work under. If for instance a hospital is nearby, GPs tend to send their patients to the hospital sooner than GPs at greater distances. Within the same conditions there will consequently be less variation in behaviour than between conditions. This process of rapid adaptation through shared circumstances can be distinguished from selection and gradual adaptation to each other by comparing GPs working under the same circumstances. The adaptation to common circumstances will supposedly be much quicker than the adaptation through interaction, peer review and behavioural confirmation. Research into the effects of a change of payment system, for instance, showed a rapid adaptation to the new circumstances (Krasnik et al., 1990).

Three parallel ways of distinguishing between the different explanations, selection, adaptation and working under the same circumstances, can be followed (Fig. 1). In the first a distinction is made between selection on the one hand and adaptation and circumstances on the other. In the second we can distinguish between selection and circumstances as showing no time

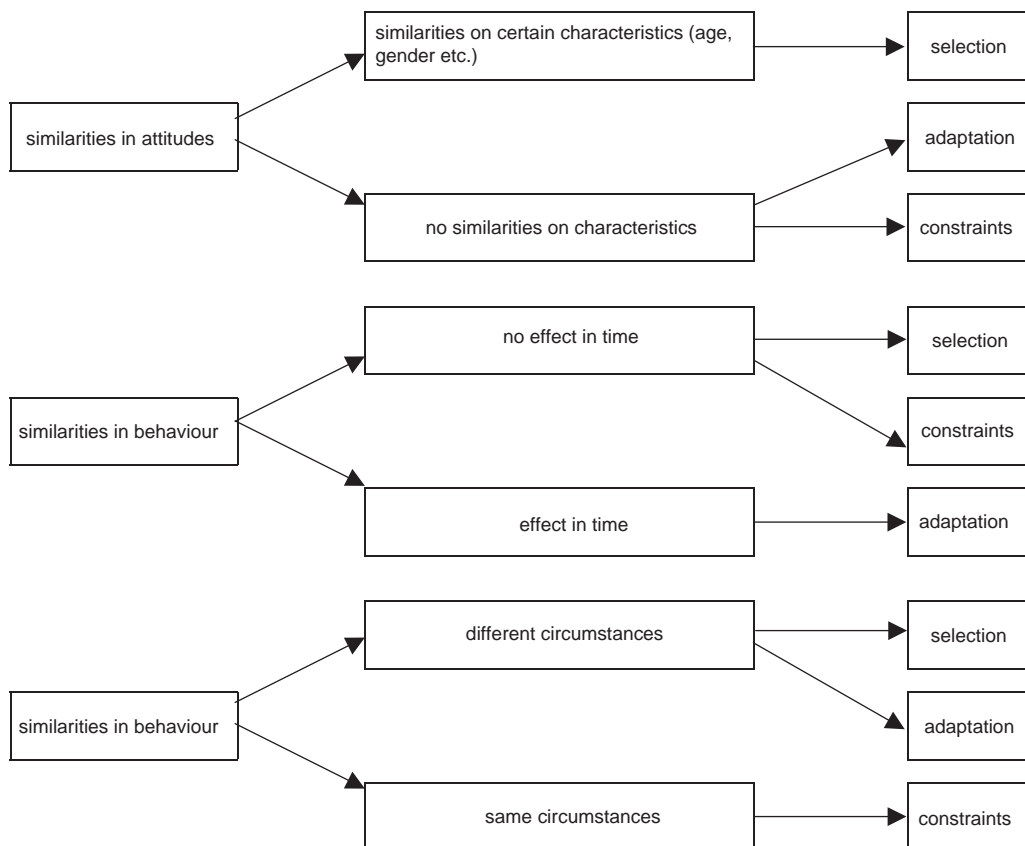


Fig. 1. Interpretation scheme to distinguish between selection, adaptation and circumstances. Three parallel ways.

effects and gradual adaptation in being a long-term process (GPs will show more similarities if they are working in the same partnership for a longer time). In the third, circumstances are separated from selection and adaptation by looking at effects of the conditions the GPs work under (GPs show more similarities when working under the same conditions).

The general hypothesis is that:

1. GPs in partnerships are more similar in professional attitudes and behaviour to each other than to randomly chosen GPs.

The explanation of this phenomenon is sought in three directions:

- 2.1. similarities in attitudes, combined with similarities in characteristics, such as age, university and gender, point towards selection;
- 2.2. similarities in behaviour combined with an effect for the time GPs are working in the same partnership point towards adaptation;
- 2.3. similarities in behaviour combined with an effect for the same circumstances point towards similarities caused by circumstances.

Data and method

To find out whether GPs in the same practice show more similarities, we compared their attitudes, self-reported behaviour (both collected through a questionnaire), and data on actual behaviour, collected during a 3-month period in which GPs recorded basic data on each consultation. These are the dependent variables in our analysis. The data were collected in the First Dutch National Survey of General Practice, from April 1987 till March 1988 in a stratified sample of 161 Dutch GPs in 103 practices, who served 335,000 patients in total (van der Velden, 1990).

For the analysis of the behaviour of GPs in doctor–patient contacts we ruled out as much as possible differences in the demand side as a cause of differences between GPs. This was done by analysing the data separately for a number of chapters of the international classification of primary care (ICPC-chapters) (Lamberts, Wood, & Hofmans-Okkes, 1993). Those chapters were included for which enough consultations were present and that showed variation in behaviour between GPs (less than 80% of GPs doing the same) on a rather general level (diagnostics, therapeutics, prescription and referral). We selected only first contacts with the GPs in which no co-morbidity was present. GPs who did not fill in all questions on independent variables in the mailed questionnaire ($n = 12$) were left out of the analysis. Solo practices ($n = 51$) were left out of the analysis, because they might form a different group. In all, 96 GPs in 42

practices were selected. Similarities between GPs were analysed for a large number of dependent variables, describing attitudes, self-reported behaviour and behaviour reported in doctor–patient contacts (for a detailed description of the variables see Foets, Stokx, Hutten, & Sixma, 1991).

To find out whether GPs in the same partnership are indeed more similar in attitude and behaviour than randomly chosen GPs, we could have used a standard multi-level model, with two levels: doctors at the lower level nested within practices at the higher level. If the between practice variance is significantly larger than zero, there is clustering at the practice level. In other words, doctors working in the same practice show similarities. However, with this standard multi-level model there are two problems: due to a small number of partners the estimates have wide confidence intervals. Secondly, it is not possible to explain similarities. If within practice variation becomes smaller by, for example, adding the age of the GPs as an explanatory variable, this is due to a general effect of age, but it does not necessarily mean that GPs working together show more similarities because of similar ages. Hence, both because of small numbers within practices and because of the specific hypotheses about the mechanisms we had to use a different strategy.

The alternative strategy is based on pairs of GPs. Our basic assumption is that the absolute difference for a certain dependent variable between two GPs is smaller if these GPs work in the same practice, than if they work in different practices. We constructed two kinds of pairs: all possible pairs of GPs working in the same partnership (actual pairs), and randomly constructed pairs of GPs not working in the same partnership (random pairs). The actual pairs are made within one partnership; two GPs working in the same partnership form an actual pair. For each partnership, all possible actual pairs are made. For the random pairs the second GP of a pair is randomly chosen with replacement from all GPs in the sample, with exclusion of the GPs from the same partnership. Difference scores were computed for all dependent variables, for each pair. For example, for practice 1 (Table 1) we have three difference scores, one for the actual pair and two for the random pairs. The variables now measure the extent to which the two GPs differ.

Because it is plausible that GPs will show consistent similarities in attitudes and behaviour for different types of attitudes and behaviour, different random pairs for each type of attitude and behaviour were made. By doing so, the tests for the different types of attitudes and behaviour are independent. This is important, because we were interested in differences between pairs of doctors, and not in consistency of attitudes or behaviour of individuals.

Table 1
Pairs of GPs

Practice	GPs	All actual pairs	Possible random pairs
1	GP 1.1 GP 1.2	(1.1, 1.2)	(1.1, 2.1); (1.2, 1.1);
2	GP 2.1 GP 2.2 GP 2.n	(2.1, 2.2); (2.1, 2.n); (2.2, 2.n)	(2.1, 1.1); (2.2, 1.2); (2.n, 1.1)
N	GP n.1 GP n.2 GP n.n	(n.1, n.2); (n.1, n.n); (n.2, n.n)	(n.1, 1.2); (n.2, 2.2); (n.n, 2.n)

To take into account the dependence of pairs that belong to the same practice, multi-level analysis was used. Difference scores computed for each dependent variable for actual and random pairs were analysed using MLwiN (Snijders & Bosker, 1999). We examined size and direction of the differences between pairs, to see if these differences are smaller within actual pairs than within random pairs. We did not develop any hypotheses about the actual dependent variables separately, except for the distinction between attitude and behaviour. Hence, we will not pay attention to or try to interpret specific differences. We only report on the number of times we found smaller differences for actual pairs than for random pairs. Since it is assumed that actual pairs differ from random pairs, we should explicitly model this. For both the actual and the random pairs we have separate means and separate variances at the two levels.

For the equation we refer to Appendix A.

Similarities

To test the hypothesis whether actual pairs show more similarities, we will only examine the fixed effects (β_0 and β_1 , Appendix A), for there are not enough pairs to estimate meaningful variances. It is expected that β_0 , the mean difference for the dependent variable within actual pairs, approaches zero and β_1 , the mean difference for the dependent variable within random pairs, is significantly greater than zero. Consequently, β_1 will be significantly greater than β_0 .

Explanations

For testing the mechanisms selection, adaptation and circumstances, differences between members of the pairs are examined to find out whether the introduction of explanatory variables decreases differences in attitude or behaviour between pairs. Because of the hypothesis that differences within actual pairs are smaller than within

random pairs, we tested one-tailed at a 95% confidence interval (corresponding to Chi square = 2.71). The explanatory variables are centred around the overall mean of the pairs for that variable, separately for actual and random pairs. The equation is presented in Appendix B.

Selection

For variables indicating selection, a difference is measured for both the actual and the random pairs. If selection causes similarities, two conditions must apply. First, the difference for variables indicating selection, for example age, within actual pairs will be smaller than within random pairs. Secondly, when adding the indicators of selection, the differences in the dependent variables between actual and random pairs will decrease (absolute $\beta_0 - \beta_1$, Appendix B). The effect of a difference in an indicator will be more or less the same for actual and random pairs. We used two variables to indicate selection: age and gender of GPs.

Adaptation

We only used one variable indicating adaptation, viz. the years GPs work together. This variable was defined only for actual pairs. Random pairs have not worked together and hence the number of years they have worked together has been fixed at zero. Adding this variable will decrease the difference within actual pairs (β_0 , Appendix B). This difference will be smaller when GPs have been working together for a longer period of time, therefore, the coefficient (β_4 , Appendix B) will show a negative sign.

Circumstances

Differences in circumstances only exist within random pairs. Actual pairs work under the same circumstances by definition. Therefore, the difference for actual pairs is fixed at zero. Variables indicating circumstances will decrease differences within random pairs (β_1 , Appendix B). Furthermore, we will look at the sign of the explanatory variable coefficient (β_5 , Appendix B), which is expected to be positive.

We will only look at those parameters, that are relevant for testing the hypotheses, as indicated in Table 2.

All variables indicating selection, adaptation and circumstances were entered in one analysis. Hence, the effect of each variable was in combination with the other variables. The result of the analysis in which explanatory variables are included may be compared with the empty model. Including the explanatory variables can improve the model (smaller differences within pairs) or worsen it (larger differences within pairs).

Table 2
Testing explanations, expected effects

Parameter	Selection variables	Adaptation variables	Circumstances variables
Effect actual pairs (β_0)	Decrease	Decrease	—
Effect random pairs (β_1)	—	—	Decrease
Effect adaptation (β_4)	—	Negative	—
Effect circumstances (β_5)	—	—	Positive
Difference expl vars actual pairs ($\Delta(\text{Sap})_{ij}$)	$<(\Delta((\text{Srp})_{ij}))$	—	—
Difference between actual and random pairs (absolute $\beta_0 - \beta_1$)	Decrease	—	—

Results I

Similarities within partnerships

Table 3 presents the mean differences between actual and random pairs concerning the attitudes, self-reported behaviour and behaviour reported in doctor–patient contacts. For attitudes, differences within actual pairs are smaller than within random pairs for nine out of 14 variables. For five variables, the differences within the random pairs are smaller. Three significant values are found. There is no convincing evidence for the hypothesis that GPs working in the same partnership (actual pairs) show more similarities in attitudes than GPs not working in the same partnership (random pairs).

In the case of self-reported behaviour, GPs working in the same partnership show for all three variables more similarities. Two of these differences are statistically significant, which is in line with the hypothesis.

For behaviour reported in doctor–patient contacts, it was found that the duration of a contact in general and the time a consulting hour contact takes show significant differences. Actual pairs are more alike than random pairs.

Owing to the number of separate items of behaviour, analysed for each of seven ICPC-chapters, a large number of tests have been performed. The results of those tests are reported separately in Table 4. A total of 71 items were tested and 24 statistically significant values were observed. This is more than could be expected on the basis of chance ($p = 0.05$), on which basis we could expect only four statistically significant values.

We may conclude that in the majority of cases differences within actual pairs are smaller than within random pairs, indicating that GPs in the same partnership are more similar than GPs not working in the same partnership. Differences indicating that actual pairs are less alike than random pairs with a magnitude approaching significance were not observed.

Results II

Explanations (Table 5)

Table 3

Differences between actual and random pairs of GPs in attitudes, self-reported and behaviour reported in doctor–patient contacts

Attitudes	Mean difference between pairs	Chi square
Uncertainty	0.30	0.13
Risks	−0.16	2.80
Task perception		
General	0.06	0.00
Diagnosis	−0.05	1.43
Therapy	−0.07	4.25
Somatic	0.07	0.51
Psycho-social	−0.05	0.60
Feeling of competence		
Somatic	0.09	1.03
Psycho-social	−0.09	1.77
Democratic attitude	−0.10	5.77
Social attitude	−0.08	1.78
Locus of control	−0.04	0.86
Psycho-social factors	0.00	0.00
Prescription	−0.02	0.09
Self-reported behaviour		
Medical techniques used	−0.29	11.90
Handling work style elements	−0.19	3.92
Task profile	0.09	0.82
Behaviour reported In doctor–patients contacts		
Time a contact takes	−0.45	5.64
Time a consulting hour contact takes	−0.59	6.75

Note: “Bold printed” means for which variables the differences are significant.

A positive difference means that random pairs are more alike than actual pairs.

Selection

The mean difference in age for random pairs is less than the mean difference in age for actual pairs, which is contrary to our expectation. Actual and random pairs show approximately the same distribution of exclusively male or female pairs. Adding the variables indicating

Table 4

Summary of differences between actual and random pairs of GPs in actions for certain complaints

Variable	Respiratory	Musculoskeletal	Blood, blood-forming	Circulatory	Digestive	Eye	Ear
Diagnosis	−0.03	—	−0.01	0.01	0.00	−0.01	−0.01
Internal diagnosis	−0.05	—	−0.01	0.00	0.00	0.00	0.00
External diagnosis	—	—	0.06	—	—	—	—
Clinical diagnosis	−0.03	—	−0.02	0.01	0.01	−0.02	−0.01
Blood test	—	—	−0.03	—	—	—	—
Haematology	—	—	0.03	—	—	—	—
Treatment	−0.06	−0.04	−0.12	−0.05	−0.05	0.00	−0.05
Therapeutic counselling	−0.03	−0.06	−0.05	−0.01	−0.03	0.00	−0.02
Information	−0.04	−0.03	−0.04	−0.04	−0.11	−0.09	−0.07
Other investigation	—	—	—	—	—	−0.01	—
Medical techniques	—	—	—	—	—	—	−0.05
Wait and see	—	−0.02	0.00	—	−0.01	—	—
Rules	—	—	—	—	0.00	—	—
Medication	−0.03	−0.03	−0.09	0.01	−0.04	−0.03	−0.02
Sys. Antibiotic	−0.04	—	−0.01	—	—	—	—
Analgetic	0.05	—	—	—	—	—	—
Cough/cold-remedy	−0.04	—	—	—	—	—	—
Nasal use	−0.03	—	—	—	—	0.00	−0.04
Anti-rheumatic	—	−0.04	—	—	—	—	—
Other medication	—	—	−0.03	0.00	−0.03	−0.03	−0.01
Referral within							
Primary care	—	−0.03	—	—	—	—	—
Secondary care	—	—	—	0.00	—	—	—
Referral cutting specialism	—	—	—	—	—	−0.03	—

“Bold printed” means for which variables the differences are significant. “—” means that it was not in the analysis.

Table 5

Summary of the effects for indicators on selection, adaptation and circumstances for 90 variables, based on sign, not significance

Parameter	Selection variables	Adaptation variables	Circumstances variables
Effect actual pairs (B_0)	43% decrease	33% decrease	—
Effect random pairs (B_1)	—	—	51% decrease
Effect adaptation (B_4)	—	51% negative	—
Effect circumstances (B_5, B_6, B_7, B_8)	—	—	51% positive
Difference expl vars actual pairs ($D(\text{Sap})_{ij}$)	9.5 (s.d. 7.3)	—	—
Difference expl vars random pairs ($D(\text{Srp})_{ij}$)	6.7 (s.d. 6.3)	—	—
Difference between actual and random pairs (absolute $B_0 - B_1$)	44% decrease	—	—

selection to the model decreases differences within actual pairs (β_0) for 39 out of 90 variables (43%). The differences between pairs decrease (absolute $\beta_0 - \beta_1$) for 40 variables (44%). This implicates that differences in age and gender do relate to differences in attitude and behaviour. However, there is no selection based on similar age or gender that makes actual pairs more alike than random pairs.

Adaptation

For 30 out of 90 variables (33%) the difference within actual pairs (β_0) decreases when explanatory variables are included. For 46 out of 90 variables (51%) the

coefficient (β_4) shows a negative sign; differences are smaller when GPs are working together longer.

Circumstances

We took into account four variables for circumstances. For 90 dependent variables we added the four explanatory variables. For 46 out of 90 variables (51%) the differences within random pairs (β_1 , Appendix B) decrease when explanatory variables are included. We found in 182 out of 360 cases (51%) a positive sign for the coefficients of the four variables. This means that differences are larger when circumstances differ (Table 5).

Discussion

In this study we found more similarities between GPs sharing a work-environment than between GPs not sharing a work-environment. Similarities mainly concerned self-reported behaviour and behaviour reported in doctor–patient contacts. Less similarities were found in attitudes. This gave a first clue to an explanation of similarities based on circumstances. If selection and adaptation were the main mechanisms causing similarities, we would have expected attitudes to be more similar within partnerships.

Differences between GPs are smaller when variables indicating selection, adaptation and circumstances are included in the statistical analysis. Overall, for 51 out of 90 variables (57%) the differences between actual and random pairs (absolute $\beta_0 - \beta_1$) decrease when all explanatory variables are included. Furthermore, it can be concluded that most indications point towards circumstances and to a lesser extent towards adaptation.

The implication of this study is that medical practice variations are not merely individual differences in preferred practice style, but patterned by social processes in partnerships and local circumstances. This knowledge is important to enhance the prospects of effective health care policies (Stano, 1993). If the mechanisms of selection, adaptation and circumstances cause GPs to be alike, this has implications for the way guidelines should be implemented. Just making GPs aware of the fact that guidelines exist will not work if they share a practice with GPs confirming each others behaviour: why would they use the guidelines? Knowing what causes GPs to act the way they do provides opportunities to find effective incentives for influencing their medical behaviour. Davis, Gribben, Scott, and Lay-Yee (2000) concluded in their study on physician practice styles that each explanation of variation has different implications for the development and successful implementation of clinical guidelines. It is important to find explanations for variation and to recognise that these can be a cause of persistent behaviour of GPs. Our study suggests that variation between practices is primarily caused by differences in circumstances. For the implementation of guidelines, these circumstances should be taken into account. Furthermore, adaptation seems to play a role and this knowledge can be used for implementation, e.g. by starting peer groups. The limited influence of adaptation found in this study would implicate that it is not enough to send one GP from a partnership to a training course, hoping that information will also diffuse to colleagues.

In this study no evidence was found that selection based on similar age and gender forms an explanation for similarities between GPs sharing a work-environment. This finding does not necessarily imply that selection does not play a role in explaining similarities

within partnerships. The results of this study point towards the importance of similarities based on circumstances and to a lesser extent on adaptation, at least for the GPs in the analyses. More research should be done to provide a broader test of the mechanism of selection.

In this study a limited number of indicators for selection, adaptation and circumstances were used, based on availability in the data set. For selection only age and gender could be used. We assumed that similarities in age and gender of partners would implicate selection and that similarities in attitudes and behaviour could be explained by these variables. There is always implicit or explicit selection when GPs try to find a partner. Our analysis derives selection from characteristics being the same, but actual selection processes could also be based on opposite characteristics, e.g. when an older GP specifically looks for a younger partner. The university where GPs studied, as mentioned as an indication for selection in the hypothesis, was not taken into account, because the data on this variable were not appropriate for use in this study. Based on the variables used, we concluded that selection does not play a role, first of all because these variables do not cluster within partnerships. However, there still could be other explicit as well as implicit characteristics that are important in explaining similarities within practices.

Data used in this study are rather old; they were collected in 1987/1988. This would have been a problem in a purely descriptive study. However, mechanisms causing more similarities within partnerships than between partnerships will not have changed and could be tested with these data. There is no reason to assume that selection and adaptation processes are strongly influenced by changes over time. However, it could be argued that, dependent on specific circumstances, one is more important than another. Secondary data were used and the sample size was fixed. It should be mentioned that the sample was not very large, only 96 GPs, and to get better results more GPs should be included.

Furthermore, we tested at the level of pairs of GPs and not at the level of individual GPs. One outlying GP in a partnership of three causes two outlying relationships of a total of three relationships. There is thus an underestimation of similarities within the partnership and our hypothesis is tested more strictly than when it would have been possible to study individual GPs instead of pairs.

Processes of selection, adaptation and circumstances described in this study are general for people working and living together. Selection is important because a colleague should be someone with whom it is pleasant to work and with whom there is not much to argue about. Probably there are more occupations that are comparable to the situation of GPs. We could think of lawyers and other occupations in which client situations differ, every client is unique, but still there should be

uniformity in the “product”. Unlike GPs, lawyers and auditors are trained for a long time before they become a partner (Lazega, 2001). The amount of time it usually takes to become a full partner could cause a difference between professions in the importance of selection and adaptation. It might be true that selection plays an important role in explaining similarities within partnerships and differences between partnerships. No matter whether these are medical partnerships, partnerships of lawyers or others. Members of the partnership select their partners in order to minimise future problems in cooperation.

For a number of reasons, the analyses presented here are not definite, it could be questioned whether the variables used really implicate the mechanism we presumed they would implicate (validity) and whether the number of different operationalisations is enough to give a good guess about the explanation of similarities. However, a first step has been taken by showing the existence of similarities between partners and by specifying three possible mechanisms to explain these similarities. A further step requires a more in-depth study of the processes of selection and mutual influence that take place in teams of health care providers. The study of these mechanisms contributes to our understanding of problems in the implementation of guidelines.

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Appendix A. Basic model

$$\begin{aligned}\Delta y_{ij} &= \beta_{0ij}\Delta(y_{ap})_{0ij} + \beta_{1ij}\Delta(y_{rp})_{1ij}, \\ \beta_{0ij} &= \beta_0 + u_{0j} + e_{0ij}, \\ \beta_{1ij} &= \beta_1 + u_{1j} + e_{1ij}.\end{aligned}\quad (1)$$

Δy_{ij} = absolute difference in the value of the dependent variable,

i = pairs,

j = practices,

$\Delta(y_{ap})$ = intercept variable for actual pairs,

$\Delta(y_{rp})$ = intercept variable for random pairs,

β_{0ij} = mean and variance parameters for actual pairs,

β_0 = mean for actual pairs,

u_{0j} = level 2(practices) variance for actual pairs,

e_{0ij} = residual variance for actual pairs,

β_{1ij} = mean and variance parameters for random pairs,

β_1 = mean for random pairs,

u_{1j} = level 2(practices) variance for random pairs,

e_{1ij} = residual variance for random pairs.

Appendix B. Model with explanatory variables

$$\begin{aligned}\Delta y_{ij} &= \beta_{0ij}\Delta(y_{ap})_{0ij} + \beta_{1ij}\Delta(y_{rp})_{1ij} + \sum_{h=1}^a \beta_{2ij}\Delta(S_{ap})_{hij} \\ &+ \sum_{h=1}^b \beta_{3ij}\Delta(S_{rp})_{hij} + \sum_{h=1}^c \beta_{4ij}\Delta(A_{ap})_{hij} \\ &+ \sum_{h=1}^d \beta_{5ij}\Delta(C_{rp})_{hij}, \\ \beta_{0ij} &= \beta_0 + u_{0j} + e_{0ij}, \\ \beta_{1ij} &= \beta_1 + u_{1j} + e_{1ij},\end{aligned}\quad (2)$$

Δy_{ij} = absolute differences in the value of the dependent variable,

i = pairs,

j = practices,

$\Delta(y_{ap})_{0ij}$ = intercept variable for actual pairs,

$\Delta(y_{rp})_{1ij}$ = intercept variable for random pairs,

β_{0ij} = conditional mean and variance parameters for actual pairs,

β_0 = conditional mean for actual pairs,

u_{0j} = level 2(practices) variance for actual pairs,

e_{0ij} = residual variance for actual pairs,

β_{1ij} = conditional mean and variance parameters for random pairs,

β_1 = conditional mean for random pairs,

u_{1j} = level 2(practices) variance for random pairs,

e_{1ij} = residual variance for random pairs,

$\Delta(S_{ap})_{hij}$ = absolute difference of variables($h = 1$ till $h = a$) indicating selection for actual pairs,

$\Delta(S_{rp})_{hij}$ = absolute difference of variables($h = 1$ till $h = b$) indicating selection for random pairs,

$\Delta(A_{ap})_{hij}$ = absolute difference of variables($h = 1$ till $h = c$) indicating adaptation for actual pairs,

$\Delta(C_{rp})_{hij}$ = absolute difference of variables($h = 1$ till $h = d$) indicating circumstances for random pairs,

$\beta_{2ij}, \beta_{3ij}, \beta_{4ij}, \beta_{5ij}$ = regression coefficient for variables,

h = number of variables,

$a = 2$,

$b = 2$,

$c = 1$,

$d = 4$.

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